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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,762	08/01/2003	Harunori Hirao	4296-166 US	5045

7590 12/15/2004  
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EXAMINER

PUTTLITZ, KARL J

ART UNIT PAPER NUMBER

1621

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	<b>Application No.</b> 10/632,762	<b>Applicant(s)</b> HIRAO ET AL.	
	<b>Examiner</b> Karl J. Puttlitz	<b>Art Unit</b> 1621	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 September 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

The rejection under section 112, second paragraph are withdrawn in view of Applicant's amendments that clarify the acrylic acid "onbtaind" in step b, and positivley reciting steps in claim 6. The examiner notes that this correction should also be applied to claim 7 to expedite allowance of the case.

The rejection under section 103 is maintained and repeated below.

Applicant's remarks in connection with this rejection are also addressed below:

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,873,368 to Kadowski et al. (Kadowski).

The rejected claims are drawn to, inter alia, a method for the production of acrylic acid comprising a step of introducing a mixed gas containing propylene and molecular oxygen into a first reaction zone packed with a complex oxide catalyst having molybdenum and bismuth as essential components and oxidizing propylene and obtaining an acrolein-containing gas, a step of introducing said acrolein-containing gas into a second reaction zone packed with a complex oxide catalyst having molybdenum and vanadium as essential components and

Art Unit: 1621

obtaining an acrylic acid-containing gas, and a step of introducing said acrylic acid-containing gas into an acrylic acid absorption column and causing it to contact an absorbent thereby obtaining an acrylic acid-containing solution.

The process further comprises the steps of:

(a) said first reaction zone and said second reaction zone being formed of different reaction tubes, (b) said mixed gas for introduction into said first reaction zone having a propylene concentration in the range of 7-15 vol. % and a water concentration in the range of 0-10 vol. %, and (c) said acrylic acid-containing solution absorbed in said acrylic acid absorption column having a water concentration in the range of 1-45 wt. %.

or

(a) said first reaction zone and said second reaction zone being formed of different reaction tubes, (b) said propylene concentration of said mixed gas introduced into said first reaction zone being in the range of 7-15 vol. % and the water concentration in said mixed gas being in the range of 0-10 vol. %, and (c) said water concentration of said acrylic acid-containing solution obtained in the acrylic acid absorption column being adjusted to a level in the range of 1-45 wt. % by adjusting the amount of an absorbent to be introduced.

See independent claims 1 and 4.

Kadowski teaches a process for the production of acrylic acid, particularly to that by two-stage, vapor-phase, catalytic oxidation of propylene. Specifically, in the first stage, a shell-and-tube heat-exchanger type is used. A shell-and-tube heat-exchanger type reactor, itself, is known. In accordance with this invention, a

Art Unit: 1621

bed of an oxidation catalyst is accommodated within each of a plurality of tubes corresponding to the cooling tubes of a shell-and-tube heat exchanger and thereby forms an elongated unit reaction zone. Through each of these unit reaction zones, the gas to be oxidized is caused to flow as a so-called tube fluid. See column 5, lines 61-68.

A catalyst which is particularly suitable for use in this invention is one which makes possible the production of a one-pass yield of approximately 88 percent or more, preferably approximately 90 percent or more for the sum of the quantities of the acrolein and acrylic acid at a reaction temperature of 280.degree. to 350.degree. C. A catalyst of this character can be selected from multiple-component catalysts containing Mo and Bi. See column 6, lines 22-30.

In the first stage, the concentration of the propylene in the feed gases is much higher than that ordinarily used, being from 7 to 15 percent. The mol ratio of the molecular oxygen to the propylene should be between 1.17 and 1.66, preferably between 1.20 and 1.50. See column 9, lines 26-35.

The second-stage reaction apparatus can be of any construction and structure suitable for and capable of receiving the gases formed in the first-stage reaction apparatus after air and steam have been added to these gases. Since the suppression of spontaneous oxidation of acrolein need not be considered in the second-stage reaction, quenching of the gases formed is not a requisite. A specific example of a suitable apparatus is one using a fixed bed catalyst. From the viewpoint of facility in controlling the reaction temperature, an apparatus of

Art Unit: 1621

shell-and-tube heat-exchanger type, as used in the first-stage reaction, is particularly suitable. See description bridging columns 10 and 11.

The feed gases for the second-stage reaction comprise the gases formed in the first-stage reaction and replenished molecular oxygen and steam necessary for the second-stage reaction. See column 11, lines 1-15.

A catalyst of this character can be selected from among multiple-component catalysts each comprising Mo and V. See column 12, lines 15-34.

The separation of the acrylic acid from the gases formed in the second-stage reaction is carried out by an ordinary method. For example, after the gases formed have been cooled to 100 to 180 C by means of heat exchanger they are caused to undergo counterflow contact with cold water containing a polymerization inhibitor or, depending on the case, cooled reaction liquor formed in the form of dew drops thereby to cause the gases to condense thereby to obtain an aqueous solution of acrylic acid.

The difference between Kadowski and the claimed inventions is that Kadowski does not teach the invention with particularity so as to amount to anticipation (See M.P.E.P. § 2131: "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).). However, based on the above, Kadowski

teaches the elements of the claimed invention with sufficient guidance, particularity, and with a reasonable expectation of success, that the invention would be *prima facie* obvious to one of ordinary skill (the prior art reference teaches or suggests all the claim limitations with a reasonable expectation of success. See M.P.E.P. § 2143).

Applicant argues that, as opposed to the invention as claimed, Kadowski neither discloses nor suggests the absorption step b), as claimed in the present invention, resulting in solution with a water concentration in the range of 1 - 45 wt.%. However, given the breadth of this range those of ordinary skill would expect that the concentration of acrylic acid in the resulting solution of Kadowaki would be in this broad range of 1 to 45 wt %. The record does not contain any objective evidence to the contrary.

Applicant also argues that the invention as presently claimed limits in (a) the water concentration to between 0 - 10 vol. %. In contrast, Kadowski teaches a ratio of steam/propylene that is limited to less than 4, resulting in a range of permissible steam from 0 to 28 % at the low end of propylene concentration to 0 to 60% at the high end of propylene concentration, which is a very broad condition. However, notwithstanding the broad range set forth in Kadowaki, the reference teaches the claimed range of water concentration with the requisite particularity and guidance to support a *prima facie* case of obviousness.

The outstanding double patenting rejection is withdrawn in view of Applicant's amendments differentiating the instant process as having two separate reactors from that of the copending application, which comprises a single reactor with two separate reaction zones. The examiner notes that the instant amendment clarifying the instant process into two separate reactors is supported at page 11, lines 6-24 of the instant specification.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl J. Puttlitz whose telephone number is




Art Unit: 1621

(571) 272-0645. The examiner can normally be reached on Monday-Friday (alternate).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on (571) 272-0646.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

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